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OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER
SIEK, VUTHE

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NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

	Application No.	Applicant(s)
Office Action Summary	10/673,506	STRANG, ERIC J.
	Examiner	Art Unit
	Vuthe Siek	2825

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 May 2007*.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-69* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1.   This office action is in response to application 10/673,506 and RCE with

amendment filed on 10/26/2006. Claims 1-69 remain pending in the application.

Double Patenting

2.   The nonstatutory double patenting rejection is based on a judicially created
doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the
unjustified or improper timewise extension of the "right to exclude" granted by a patent
and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11
F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225
USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA
1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*,
418 F.2d 528, 163 USPQ 644 (CCPA 1969).
        A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be
used to overcome an actual or provisional rejection based on a nonstatutory double
patenting ground provided the conflicting application or patent is shown to be commonly
owned with this application. See 37 CFR 1.130(b).
Effective January 1, 1994, a registered attorney or agent of record may sign a terminal

disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37

CFR 3.73(b).

3.   Claims 1-69 are provisionally rejected under the judicially created doctrine of

obviousness-type double patenting as being unpatentable over claims 1-44, 1-58, 1-1-

48, 1-78 and 1-62 of copending Application No. 10/673,138, 10/673,467, 10/673,501,

10/673,507, 10/673,583 and 10/673,583 respectively. Although the conflicting claims

are not identical, they are not patentably distinct from each other because the claims

refereed to a method performed by a semiconductor processing tool comprising

inputting process data, inputting a first principles physical model, performing a first

principles simulation and using the first principles simulation result except for using first

principles simulation result: to determine a fault in the actual process as in the instant

application; to facilitate the actual process as in copending Application No. 10/673,138;

to built an empirical model as in copending Application No. 10/673,467; as part of a data

set the characterizes the actual process as in copending Application No. 10/673,501; to

control the process as in copending Application No. 10/673,507; and using the virtual

sensor measurement to facilitate the actual process as in copending Application No.

10/673,583. Since the claims include identical structures, they would been anticipated

various functions are recited in the claims.

This is a <u>provisional</u> obviousness-type double patenting rejection because the

conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made

5.   Claims 1-25, 32-56 and 63-69 are rejected under 35 U.S.C. 103(a) as being

obvious over Sonderman et al. (6,802,045) in view of Kee et al. (5,583,780).

6.   As to claims 1, 32, 63 and 66, Sonderman et al. teach substantially similar

claimed invention of a method and apparatus for analyzing a process performed by a

semiconductor processing tool (Fig. 1-8 and its description) comprising inputting

process data relating to an actual process performed by the semiconductor processing

tool (process control environment 180 receives process data (process data relating an

actual process being by semiconductor processing tool) from the manufacturing

environment 170, at least col. 3 lines 50-64; Fig. 1); inputting a first principles physical

model relating to the semiconductor tool (simulation environment 210 that includes

device physics model, process model and equipment model, at least see in col. 5 lines

10-67; Fig. 3); performing a first principles simulation for the actual process being

performed during performance of the actual process (col. 5 lines 10-67; col. 7 lines 1-

20) using the physical model to provide a first principles simulation result (simulation

data output by a simulator 340 of Fig. 3; at least col. 7 lines 37-62) in accordance with

the process data relating to the actual process being performed in order to simulate the

actual process being performed in order to simulate the actual process being performed

(col. 3 lines 50-63; col. 4 lines 48-64; col. 5 lines 10-40; col. 7 lines 4-20; Fig. 1-3, 5, 8;

col. 5-7; specifically Fig. 3 describes a simulator simulates device physics model to

provide a first principles simulation data result; the device physics model 310, the

process model 320 and the equipment model 330 perform the functions or conditions of

the device, process, and equipment, respectively, during a particular manufacturing

process, col. 5 lines 10-67; the process control environment 180 utilizes the simulation

data received from the simulation environment 210 in order to make control parameter

adjustment or modifications for controlling manufacturing processes, col. 5 lines 40-47;

the device physics model 310 comprises components that can measure electrical

characteristics of a semiconductor wafer being manufactured; the device physics model

comprises components that emulate or measure growth of oxide film on a

semiconductor wafer; the device physics model 310 comprises components that can

model the chemical reactions that can take place one a semiconductor wafer being

processed, the process model and equipment are described (col. 5 lines 47-55); and

using the first principles simulation result obtained during the performance of the actual

process to determine a fault (error) in the process performed by the semiconductor

processing tool (Fig. 1-8, col. 5-7; specifically the simulation environment 210 includes a

process control interface 350 allowing the simulation environment 210 to perform

feedback corrections during the manufacturing of semiconductor wafers, col. 5 lines 18-

27; the simulation environment 210 determines any error due to variations in the

components in the defined models; using this error data, the system 100 of Fig. 1

performs a predictive state analysis 750 and sensitivity analysis 760 of Fig. 7;

performing the predictive state analysis comprising predictive how a certain component

within one of the models 310, 320, 330 behaves in response to modifications to another

component in any one of the models in order to determine an optimum component

levels to be implemented during manufacturing processes, described in col. 8, lines 12-

67). Sonderman et al. also teach simulating process task (actual process) to provide

simulation data results to enhance manufacturing process (col. 6 lines 24-64).

Specifically, Sonderman et al. teach the simulation environment including the above

integrated physical model and process model that is simulated by a simulator (Fig. 3).

The teachings of the simulation environment that includes device physics model,

process model and equipment model (Fig. 3, col. 5 lines 10-18, lines 47-55), clearly

suggest that the models must include some equations that are used for computation in

order to determine electrical characteristics, growth of oxide film, control parameters

and temperature. Some of equations are described in column 9. Accordingly,

Examiner believes that the simulation environment that includes a physics model,

process model and equipment model correspond to physics-based first principles

model. The simulation environment comprises a process control interface that allows

communications between the simulation environment to receive manufacturing data

from the manufacturing environment which can be used by the simulation environment

to perform feedback corrections during the manufacturing of semiconductor wafers.

There is an interaction performance between these models (physical model, process

model and equipment model). Therefore, any modifications to any one of the three

models can be made and analyzed by the simulator. The process control environment

(item 180 Fig. 1) utilizes the simulation data received from the simulation environment in

order to make control parameter adjustments or modifications for controlling

manufacturing processes. The physics model comprises components that emulate or

measure growth of oxide film on a semiconductor wafer. The device physics model also

comprises components that can model the chemical reactions that can take place on a

semiconductor wafer being processed. The process model and equipment model are

described (col. 5 lines 47-67). Thus, Sonderman et al. do not teach the first principles

physical model including a set of computer-encoded **differential equations.** Kee et al.

teach modeling apparatus that include physical models including differential equation

that can be used to develop real-time control systems for a particular actual thermal

system for processing a silicon wafer using physically simulations (Fig. 1-2, see

summary; col. 3 lines 44-50; col. 4 lines 33-38; col. 5 lines 1517; col. 5 lines 36-45; col.

7 lines 1-10). The modeling apparatus (physical models) include a set of computer-encoded differential equations of the physical model parameters to quickly account for spectral-radiation effects used in design and real-time control systems (col. 7 lines 3-44; col. 5 lines 23-67; col. 6 lines 1-67; col. 11 lines 14-67; col. 12 lines 1-67; Figs. 1-2). Columns 7-10 describe set of differential equations. Thus, the modeling apparatus includes set of differential equations (first principles physical model that includes set of differential equations) can be used with confidence to predict effects of various approximations in the radiation transport and to facilitate the design of actual thermal systems (col. 12 lines 29-41). In addition, the modeling system with differential equation executes quickly, even when processing unit 110 is implemented on workstation class computing platform. Thus, the modeling apparatus/system 101 quickly accounts for spectral-radiation effects, and, as described above, may used in design and real-time control system for processing a semiconductor wafer (col. 7 lines 3-10; col. 5 lines 15-17; col. 5 lines 36-45). With above expected results and motivation as described above, integrating the differential equations as taught by Kee et al. in Sonderman's first principles physical model would have been obvious to practitioners in the art at the time the invention.

7.   As to claims 2 and 33, Sonderman et al. teach directly inputting the data (input data, process, manufacturing data, input control parameters) relating to a process performed by the semiconductor processing tool from at least on the physical sensor and a metrology tool physically mounted on the semiconductor processing tool (Fig. 1, 7, col. 4-8).

8.   As to claims 3-5 and 34-36, Sonderman et al. teach indirectly inputting the data

relating to a process performed by the semiconductor processing tool from at least one

of a manual input device and a database, inputting data recorded from a process

previously performed by the semiconductor processing tool, inputting data set by a

simulation operator (Fig. 1-3, col. 1, manual fashion and automated fashion, col.4-7).

9.   As to claims 6-9 and 37-40, Sonderman et al. teach inputting data relating to at

least one of the physical characteristics of the semiconductor processing tool and the

semiconductor tool environment, data relating to at least one of a characteristic and a

result of a process performed by the semiconductor processing tool; inputting a spatially

resolved model of the geometry (modified models) of the semiconductor processing

tool; inputting fundamental equations necessary to perform first principles simulation for

a desired simulation result (Fig. 1-3, col. 5-9).

10.   As to claims 10-13 and 41-44, Sonderman et al. performing interaction

concurrently between simulation environment (first principles simulation) and the

semiconductor processing tool (Fig. 2); performing simulation environment (first

principles simulation) and the semiconductor processing tool (Fig. 2); performing first

principles simulation using the input data to set a boundary condition and an initial

condition of the first principles simulation model (Fig. 3, col. 5-8).

11.   As to claims 14 and 45, Sonderman et al. teach using the simulation result

(simulation data, simulation data result) to detect a fault in the process performed by the

semiconductor processing tool by comparing the first principles simulation result with

the input data (col. 7, Fig. 5-7).

12.   As to claims 15-19 and 46-50, Sonderman et al. teach a system having a

network of interconnected resources to perform at least one of the process steps as

recited in Claim 1; using code parallelization among interconnected computational

resources to share the computational load of the first principles simulation; sharing

simulation information among interconnected resources to determine the fault in the

process performed by the simulation processing tool; distributing simulation results

among the interconnected resources to reduce redundant execution of substantially

similar first principles simulations by different resources; distributing model changes

among the interconnected resources to redundant refinements of first principles

simulations by different resources (Fig. 1-3, computer code software is described in col.

9 starting line 58; col. 5-8).

13.   As to claims 20-21 and 51-52, Sonderman et al. teach remote access (Col. 9

line 58 to col. 10 line 31). Note that a wide area network is art inherent.

14.   As to claims 22 and 53, Sonderman et al. teach performing simulation utilizing a

computer software code (Col. 9 line 58 to col. 10 line 31).

15.   As to claims 23-25 and 54-56, Sonderman et al. teach using the first principles

simulation result (simulation data set results) to classify a fault in the process performed

by the semiconductor processing tool (col. 6, lines 1-35); calculating a set of

perturbations solutions corresponding to the first principles simulation for input data to

generate a profile data solutions to the first principles simulation, inputting the

perturbation solutions to a multivariate analysis; inputting a difference between the first

principles simulation result and the input data to the multivariate analysis; and utilizing

the multivariate analysis to identify a correlation between the input data and the

difference (defining variations into the components of defined models in order to

simulate the effects of online manufacturing performance by the models; modified

models) (col. 5-8).

16.   As to claims 64-65, Sonderman et al. teach interaction between simulation

environment, process control environment and manufacturing/processing environment

(sharing computational load of the simulation, sharing simulation information among

interconnected resources) (Fig. 1-3).

17.   As to claims 67-69, the integrated physical model as taught by Sonderman et al.

and Kee et al. corresponds to a first principles physical model as claimed as described

in above rejection. The simulation environment included the above integrated physical

model is simulated by a simulator (Fig. 3 of Sonderman). The simulation environment

includes device physics model, process model and equipment model (Fig. 3, col. 5 lines

10-18). The simulation environment comprises a process control interface that allows

communications between simulation environment to receive manufacturing data from

the manufacturing environment which can be used by the simulation environment to

perform feedback corrections during the manufacturing of semiconductor wafers. There

is an interaction performance between these models (physical model, process model

and equipment model). Therefore, any modifications to any one of the three models

can be made and analyzed by the simulator. The process control environment (item 180

Fig. 1) utilizes the simulation data received from the simulation environment in order to

make control parameter adjustments or modifications for controlling manufacturing

processes. The physics model comprises components that emulate or measure growth

of oxide film on a semiconductor wafer. The device physics model also comprises

components that can model the chemical reactions that can take place on a

semiconductor wafer being processed. These teachings correspond to providing for the

first principles simulation a reuse of known solutions as initial conditions for the first

principles simulation because the simulation data is reused as initial conditions for the

simulation environment.

18.   Claims 26-31 and 57-62 are rejected under 35 U.S.C. 103(a) as being obvious

over Sonderman et al. (6,802,045) in view Kee et al. (5,583,780) in further view of Fatke

et al. (US 2005/0016947).

19.   As to claims 26-28 and 57-59, Sonderman et al. do not explicitly teach the

multivariate analysis comprising a partial least square analysis; defining a set of loading

coefficients, computing at least one of mean and standard deviation values. Fatke et al.

teach these limitations including defining a correlation matrix in order to improve

detection of a feature etch completion process during semiconductor manufacturing to

thereby providing accurate and precise completion of an etch process (see abstract,

Fig. 4, summary, 0051). Therefore, it would have obvious to one of ordinary skill in the

art at the time the invention was made to combine these teachings in to the system as

taught by Sonderman et al. in order to provide an accurate and precise completion of a

process during semiconductor manufacturing.

20.   As to claims 29-31 and 60-62, Sonderman et al. attributing the difference

between simulated results and input data to one input data using the correlation; using

the simulation result to detect a fault comprising detecting a fault (error) in at least one

of a material processing system, an etch system, a photoresist spin coating system, a

lithography system, a dielectric coating system, a deposit system, a rapid thermal

processing system for thermal annealing and a batch diffusion furnace (examples

described in col. 4; detecting a fault in at least one of a chemical vapor deposition

system and a physical vapor deposition system (col. 4, 6, 7, 8).

Remarks

21.   Examiner thanks applicants for long arguments. Mainly, Applicants argued that

Sonderman et al. do not teach or suggest performing a first principles simulation for the

actual process being performed during performance of the actual process using the

physical model to provide a first principles simulation result in accordance with the

process data relating to the actual process being performed in order to simulate the

actual process being performed. Applicants argued that the simulation process as

described in Kee et al. is "a lengthy and costly intensive process" and therefore would

not be compatible with real-time process control in which, as defined in the claims, a

first principles simulations is performed for the actual process being performed **during

performance of the actual process**. Examiner disagrees. Kee et al. teach that the

conventional approach which merely solves the direct problem repeatly, in lengthy and

costly iterative process (col. 4 lines 22-38). Kee et al. clearly teach modeling apparatus

101 generates a model of a thermal system [physical model that includes set of

differential equations] sufficiently rapidly to permit the model to be used in design of the

thermal system as well as in the development of control software for the thermal system

using real-time feed back from the modeling apparatus 101 (col. 3 lines 43-63; col. 5

lines 15-17; col. 5 lines 36-45; col. 6 lines 14-27; col. 7 lines 3-10). Cleary, Sonderman

et al. teach firs principles simulation that is performed for the actual process being

performed **during performance of the actual process**. Sonderman et al. teach an

integrated system (Fig. 1, 2, 3, 5, 7, 8) that provides an interaction between a process

control environment 180, a manufacturing/processing environment 170, and a

simulation environment 210 (col. 4 lines 48-64). Fig. 3 shows performing simulation of

first principles simulation. Sonderman et al. teach performing first principled simulation

that is performed for the actual process being performed during performance of the

actual process (col. 7 lines 1-20; col. 8 lines 1-11). Thus, it is not true that Sonderman

teach only performing simulation of first principles simulation for the actual process

before performance of the actual process. The integrated system described in Fig. 1, 2,

3, 5, 7 and 8) performs first principles simulation for the actual process being performed

during performance of the actual process. It can be seen clearly from Fig. 1 and 2, there

is interaction between a process control environment 180, a manufacturing/processing

environment 170, and a simulation environment 210 (col. 4 lines 48-64). Applicants

depend on Fig. 4, and argued that Sonderman et al. teach performing first principles

simulation for the actual process **before** performance of the actual process. It is not true

because Fig. 1 and 2 described there is interaction between the environments 170, 180

and 210. Clearly Fig. 2 shows that interaction. The environments as shown in Fig. 2 can

of course be performed currently and any order. Fig. 3 shows a simulator that controls

the process. Fig. 5 & 7 show application of simulation results to manufacturing

parameters. For at least these reasons, the claimed invention is not allowable over Kee

and Sonderman's teachings. The combination of teachings (to include differential

equations from Kee) would expect desired results in real-time process control between

all these environments described in Fig. 1, 2, 3, 5, 7 and 8 of Sonderman. Applicants

also argued that prior art teach away. Examiner disagrees because differential equation

is useful in generating models (physics models) as taught by Sonderman. Therefore

nothing that shows the prior art teaches away from the combination because of using

differential equations. Applicants argued that the prior art use pre-generated model. The

models as taught by Sonderman are generated and can be modified in order to provide

best result. In addition, from the disclosure as a whole, Sonderman et al. teach a

simulation environment that includes device physics model, process model and

equipment model (Fig. 3, col. 5 lines 10-18, corresponding to a first principles physical

model). The device physics model comprises components that can measure electrical

characteristics of a semiconductor wafer being manufactured. The device physics

model also comprises components that emulate or measure growth of oxide film on a

semiconductor wafer. The device physics model also comprises components that can

model the chemical reactions that can take place on a semiconductor wafer being

processed (col. 5 lines 48-55). The process model and the equipment model are

described (see col. 5 lines 56-67). These models clearly suggest that they must include

some equations that are used for computation in order to determine electrical

characteristics, growth of oxide film, control parameters and temperature. Some

equations have been described (col. 9). Accordingly, Examiner believes that the

simulation environment that includes a physics model, process model and equipment

model correspond to physics-based first principles model. The Sonderman et al. does

not teach the simulation environment (first principles physical model) including

differential equations. Kee et al. teach modeling apparatus that include physical models

including differential equation that can be used to develop real-time control systems for

a particular actual thermal system for processing a silicon wafer using physically

simulations (Fig. 1-2, see summary; col. 3 lines 44-50; col. 4 lines 33-38; col. 5 lines

1517; col. 5 lines 36-45; col. 7 lines 1-10). The modeling apparatus (physical models)

include a set of computer-encoded differential equations of the physical model

parameters to quickly account for spectral-radiation effects used in design and real-time

control systems (col. 7 lines 3-44; col. 5 lines 23-67; col. 6 lines 1-67; col. 11 lines 14-

67; col. 12 lines 1-67; Figs. 1-2). Columns 7-10 describe set of differential equations.

Thus, the modeling apparatus includes set of differential equations (first principles

physical model that includes set of differential equations) can be used with confidence

to predict effects of various approximations in the radiation transport and to facilitate the

design of actual thermal systems (col. 12 lines 29-41). In addition, the modeling system

with differential equation executes quickly, even when processing unit 110 is

implemented on workstation class computing platform. Thus, the modeling

apparatus/system 101 quickly accounts for spectral-radiation effects, and, as described

above, may used in design and real-time control system for processing a semiconductor

wafer (col. 7 lines 3-10; col. 5 lines 15-17; col. 5 lines 36-45). Thus, Kee et al. teach, as

a whole, modeling apparatus that include physical models that can be used to develop

real-time control systems for a particular actual thermal system for processing a silicon

wafer. The modeling apparatus (physical models) include a set of computer-encoded

differential equations of the physical model parameters to quickly account for spectral-

radiation effects used in design and real-time control systems for processing a silicon

wafer of a semiconductor device (col. 7 lines 3-44; col. 5 lines 23-67; col. 6 lines 1-67;

col. 11 lines 14-67; col. 12 lines 1-67; Figs. 1-2). Columns 7-10 describe set of

differential equations. Thus, the modeling apparatus includes set of differential

equations as taught by Kee (first principles physical model that includes set of

differential equations) can be used with confidence to predict effects of various

approximations in the radiation transport and to facilitate the design of actual thermal

systems for processing a semiconductor wafer (col. 12 lines 29-41). With above

expected results and motivation, integrating the differential equations as taught by Kee

et al. in Sonderman's first principles physical model would have been obvious to

practitioners in the art at the time the invention was made by considering the teachings

as a whole from the cited references. The combined teachings, as a whole, render the

claim limitation of first principles physical model including a set of computer-encoded

differential equations obvious to practitioners the art at the time the invention was made.

Examiner disagrees with Applicants that argued that Sonderman does not teach or

suggest a first principles simulation for the actual process being performed. Sonderman

et al. teach simulating the simulation environment (integrated physics model, process

model and equipment model) (Fig. 3). Fig. 1 shows an integrated system 100

comprising a process control environment 180, a manufacturing/processing

environment 170, and a simulation environment 210. The process control environment

180 controls the operations of the manufacturing environment 170. The process control

environment comprising an APC framework and can receive data from manufacturing

environment 170 and simulation environment and make approximate change to

manufacturing control parameters to affect the operations of the manufacturing

environment 170 (col. 3 lines 50-63, see also col. 4 lines 47-64; col. 7 lines 1-20; this is

real-time process). Accordingly, Examiner believes that Sonderman et al. teach

performing first principles simulation for the actual process being performed during

performance of the actual process using the physical model and using the first

principles simulation result obtained during the performance of the actual process to

determine a fault in the actual process performed by the semiconductor process tool.

Sonderman et al. clearly describes that the device physics model also comprises

components that can model the chemical reactions that can take place on a

semiconductor wafer being processed (col. 5 lines 47-55). These cited portions as

taught by Sonderman et al. clearly teach the claim limitation of performing first principles

simulation for the actual process being performed. Also, Examiner has interpreted the

cited portion description by applicants (col. 7 lines 14-18 of Sonderman) different way

from Applicants. The cited portion recited "the **defined models** (simulation environment

that includes physics model, process and equipment model) **can perform a simulation**

as if an actual manufacturing process were being performed" (col. 7 lines 14-18).

Examiner interpreted that portion as performing the defined models (simulation

environment that includes physics model, process model and equipment model

corresponding to first principles simulation) as performing first principles simulation for

the actual process being performed because the simulation imitates the actual process

being performed. This is the fact of simulation performance. Practitioners in the art

would recognize that performing a simulation model imitates the actual process being

performed. In addition, Sonderman et al. teach the device physics model comprises

components that can measure electrical characteristics of a semiconductor wafer being

manufactured. The device physics model also comprises components that emulate or

measure growth of oxide film on a semiconductor wafer. **The device physics model**

also comprises components that can model the chemical reactions that can take

place on a semiconductor wafer being processed (col. 5 lines 48-55). These

teachings clearly suggest when the simulation environment is simulated by a simulator

(Fig. 3), the simulation environment being performed imitates the actual process being

performed. Fig. 1 shows an integrated system 100 comprising a process control

environment 180, a manufacturing/processing environment 170, and a simulation

environment 210. The process control environment 180 controls the operations of the

manufacturing environment 170. The process control environment comprising an APC

framework and can receive data from manufacturing environment 170 and simulation

environment and make approximate change to manufacturing control parameters to

affect the operations of the manufacturing environment 170 (col. 3 lines 50-63, see also

col. 4 lines 47-64; col. 7 lines 1-20; this is real-time process). Accordingly, Examiner

believes that Sonderman et al. teach performing first principles simulation for the actual

process being performed during performance of the actual process using the physical

model and using the first principles simulation result obtained during the performance of

the actual process to determine a fault in the actual process performed by the

semiconductor process tool. Regarding to provisional double patenting, Examiner

acknowledges that Applicants will file terminal disclaimers upon indication of allowance

subject matter. However, there is no indication of allowable subject matter of the

present claims at this time.

22.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Vuthe Siek whose telephone number is (571) 272-1906.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Jack Chiang can be reached on (571) 272-7483. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

/Vuthe Siek/
Primary Examiner, A.U. 2825